Procedure for automatic calibration of the DSP magnetic measurement system

A. Sudnikov

Introduction

This instruction describes operation of DSP system automatic calibrator, based on GP/IB high-stable voltage source (source) and precise digital voltmeter (DVM). It does not describe mathematical post-processing of calibration data.

Measured values are saved into

`/usr/vmtf/src/velev/prof/ppc/calibration/`.

Filenames have structure:

`sampling_"gain"_"attn"_"point"_"chan".dat`

Where:

gain – input signal amplification;

attn – input signal attenuation;

chan – number of channel to calibrate;

point – serial number of measurement.

Start-up.

1. Plug cart power cable. Switch DVM and source ON.

To improve measurement precision these devices should warm-up for at least 4 hours before *main operation*.

2. Check if DSP is ON.

DSP should warm-up for at least half a day before *main operation*.

3. Connect cart GP/IB cable to appropriate DSP controller. Check if its other end is connected either to DVM or voltage source, and devices are connected to each other.

4. Check if DSP GP/IB addresses do not interfere with DVM or source ones. If so, set these addresses to empty values.

5. Connect appropriate signal cable to DSP input.
6. Boot "Scientific Linux".
7. Establish terminal connection to PPC using:

```
        Terminal command: microcom –D/dev/ttyS0
```
        If PPC is connected to COM-1 port (see rear panel of PC),
```
        Terminal command: microcom –D/dev/ttyS1
```
        If PPC is connected to COM-2 port.

8. Load Calibrator into the PPC's memory using command:
```
ld < /usr/vmtf/src/velev/sudnikov/ppc/calibrator5.r
```
9. Check if old calibrations are written in sampling directory. If so, copy them into appropriate subdirectory.

Main operation
1. Check if all start-up actions are completed.
2. Start Calibrator using command:
```
        calibrator gain, attn, chan, num
```
Where "num" corresponds to the number of measured points.
Remember that one point takes approximately 0.5 min.
Possible values:
gain: 1, 10, 100, 1000. Any other number is recognized as "gain = 1";
attn: 1, 4, 10, 16, 26. Any other number is recognized as "attn = 1";
chan: 1 to 8 to calibrate definite channel, 9 to calibrate all channels at once;
num: 3 to 1000. Larger values are recognized as 1000, smaller as 3.
3. Enter addresses.
Default values:
Source addr. = 10,
DVM addr. = 21,
Gain controller addr. = 0xfd00, (enter only fd00)
Attenuation controller addr. = 0xfe00. (enter only fe00)

Calibrator will automatically set voltages uniformly spread over dynamic range (-9.8 V to 9.8 V divided by "gain" value).
For odd values of "num" 0 volts are set once as "crowbar zero". In other case source is consequently set to -0 volts and +0 volts.

Shutting down
  1. Close terminal. DO NOT turn DSP off and shut PC down if it is not needed.
  2. Copy sampling data into appropriate subdirectory.
  3. Turn OFF DVM and voltage source.
  4. Unplug GP/IB, signal and power cables.
  5. If GP/IB addresses were changed, set them to default values (DVM addr = 21, Voltage source addr = 10)